Key Curriculum Press Response to Indiana Review of Discovering Algebra

RESPONSE TO SUMMARY COMMENTS:

Reviewer Statement			Response
Overall rating:	Moderate (2-3)	All of the standards are not covered in the text nor are mathematical ideas presented cohesively.	From Dana Center Review: Student use prior learning to learn new concepts. Recognizing and using patterns is a basis of this resource, and patterns are frequently used for students to generalize about mathematics. From Key Curriculum Press An examination of the table of contents in *Discovering Algebra* provides an example of the purposeful conceptual and skill development. ***Chapter 0 Fractions and Fractals*** reviews fractions and recursive patterns while investigating fractals. ***Chapter 1, Data Exploration*** explores data and representations of data and establishes the data-analytic approach. At the end of the chapter, students begin an analysis of linearity by looking at the algebraic function, $y=x$. ***Chapter 2, Proportional Reasoning and Variation*** looks at ratio and proportion and sets the stage for rates and slopes.. The chapter continues by looking at linear equations for direct-variation relationships, then exploring inverse variation. Algebraically, students move from $y=x$ to $y=kx$ and $y=k/x$. ***Chapter 3, Linear Equations*** ties together recursion from Chapter 0, fitting data from Chapter 1, and rate of change and linear variation from Chapter 2, and also covers solving equations with symbolic manipulation. Algebraically, students now progress from multiplying a constant to x to the intercept form, learning linearity as a starting point plus a rate of change times the number of changes, or $\boldsymbol{y = a + bx}$. This connection between tabular, graphical, and algebraic representations of linear functions is then used to introduce the traditional slope-intercept form.
Important Mathematical Ideas:	Weak (1-2)	The mathematical ideas are presented as primarily isolated ideas. They seem to be trying to integrate technology; however, the real-life contexts are lacking.	From Dana Center Review: Real-life contexts SMP 1: There are many opportunities for students to make sense and meaning in real-world problems. SMP 2: There are many examples and questions that apply mathematics in a real-world context. Students are asked to take real-world situations and represent them in symbols throughout the chapters. Real-world situations are frequently used to introduce topics in the chapters reviewed. SMP 4: Many concepts are related to things in the real world. (e.g., On p. 165 linear patterns are linked to Braille; basket weaving is linked to recursive ideas.) Technology Graphing calculators are referenced frequently throughout both the teacher resource and

			the student text. There is some discussion of strengths and weaknesses of different methods, but in the chapters reviewed, there is no contrasting of different technologies. Students are expected to use other technologies as well, like motion detectors, and algebra software is referenced occasionally. Calculators are referenced in most lessons.
Skills and Procedures:	Moderate (2-3)	The problem sets are integrated with some mathematical ideas and connections. However, the development of a new idea within a lesson is more just spelled out procedures and steps.	From Dana Center Review: The teacher notes encourage teachers to have students answer in as many ways as possible – then offer some suggestions. Students are asked to connect multiple representations (tables, graphs, equations, situations) through the practice problems and investigations. (For example, Investigation – p. 166; practice problems p. 169 #6) Multiple methods for solving problems are shown and stressed. Solving equations is done by balancing and by using graphing calculator technology. There are some opportunities for students to reflect on their model and decide what might be a better model. There are many opportunities for students to make sense and meaning in real-world problems. In summary, understanding of the underlying mathematical idea is at the heart of the lessons, and making sense of concepts was fundamental in the chapters reviewed. Students are asked repeatedly to make sense of mathematics in context as well as without context. Important mathematical ideas are developed through students observing patterns. (For example, see chapter 3.) In most sections of this resource, students investigate in order to make a generalization about an important mathematical concept. Observation and use of patterns is central to most of the investigations.
Mathematical Relationships:	Weak (1-2)	An attempt is made to connect other algebraic concepts to graphing throughout the text, but the connection could be stronger.	From the Dana Center Students are asked to connect multiple representations (tables, graphs, equations, situations) through the practice problems and investigations. (For example, Investigation – p. 166; practice problems p. 169 #6) Multiple methods for solving problems are shown and stressed. Solving equations is done by balancing and by using graphing calculator technology. There are some opportunities for students to reflect on their model and decide what might be a better model. There are many opportunities for students to make sense and meaning in real-world problems. In summary, understanding of the underlying mathematical idea is at the heart of the lessons, and making sense of concepts was fundamental in the chapters reviewed. Important mathematical ideas are developed through students observing patterns. (For example, see chapter 3.) In most sections of this resource, students investigate in order to make a generalization about an important mathematical concept. Observation and use of patterns is central to most of the investigations. Student use prior learning to learn new concepts. Recognizing and using patterns is a basis of this resource, and patterns are frequently used for students to generalize about mathematics.

RESPONSE TO SPECIFIC CONCERNS

Reviewer Statement	Response
Nothing updated since 2007 so not really aligned to Core Standards. Overall not that impressed w/examples +/or real-life ties.	For nearly forty years, Key has recognized and embraced the value of curriculum that incorporates problem solving, real-world applications, conceptual understanding, and mathematics as sense making. Scientific research supports these pedagogical approaches, which are at the heart of the curriculum we publish and central to the Common Core State Standards.
N-RN.2 No real connection to real life	In Investigation: Ants in an ant colony, depreciating value of a truck, In Exercises: Problem # 12 Buying a sofa on credit
All terms are covered in glossary but never are they all connected	
A-CED.3 Viable vs. non-viable	Lesson 5.1 Investigation p. 274—Steps 7 – 8 "Explain a real world meaning" and "Does it satisfy both equations." Exercise 6b "Explain possible real world meanings for the numbers and variables and tell why they're different from those in 6a." Lesson 5.2: Exercise 12d—"Discuss the reasonableness of this model and the solution." Lesson 5.4: Ex. B "These are true statements so the solution is correct." Lesson 5.5: Ex. B and Ex. 15 Accurately writing inequalities to reflect real-world parameters. Lesson 5.7: Investigation Step 5 "Decide if each envelope satisfies the constraints by locating the corresponding point on your graph." Step 6 "Do the coordinates of the origin satisfy this system of inequalities?..." Exercise 8d "what constraints should you add…"
F-BF.1a—Lessons 9.1, 9.2, 9.4, 9.9, 9.6, 9.7 Just quadratic	In addition to the quadratic relationships observed in Chapter 9, this standard is addressed throughout the book. Examples include: Lesson 3.1: Recursive Sequences Lesson 3.2: Linear Plots Lesson 3.4: Linear Equations and the Intercept Form Lesson 6.1: Recursive Routines Lesson 6.2: Exponential Equations Lesson 6.7: Fitting Exponential Models to Data
No absolute value, exponential, or logarithmic Absolute value, step, piecewise Not as much about exponential functions as much as properties and operations w/ exponents.	Absolute Value: pp. 418 – 421, 443-446 Exponential: pp. 344, 446-448